Claims

1. (currently amended) A method for rendering an object associated with an image with high resolution lighting characteristics, comprising:

generating a texture map associated with the image, the texture map defined by texels, wherein each of the texels are capable of having one of a one to many correspondence with respective pixels or a many to one correspondence with a single pixel;

calculating a value representing a lighting characteristic for each of the texels by sampling a center point of the texel;

storing the value;

associating a coordinate space of the texture map with a display screen coordinate space; and

rendering the image on a display screen using the stored value.

2. (previously presented) The method of claim 1, wherein the method operation of calculating a value representing a lighting characteristic for each of the texels includes,

determining visibility from the center point associated with one of the texels; and

determining a distribution of an incoming light ray.

3. (original) The method of claim 2, wherein an occlusion function is applied to determine the visibility and ray tracing is applied to determine the distribution of incoming light.

4. (original) The method of claim 1, wherein the method operation of calculating a value representing a lighting characteristic for each of the texels includes,

defining an image associated with a first resolution; and

applying a basis function to determine the value.

5. (original) The method of claim 4, wherein the value is represented by multiple coefficients.

6. (original) The method of claim 4, wherein the image on the display screen is associated with a second resolution, the second resolution being less than the first resolution.

7. (original) The method of claim 4, wherein the method operation of applying a basis function to determine the value includes,

executing a transfer function to yield the value.

8. (currently amended) A method for incorporating lighting characteristics of an image of an object into a texture map, comprising:

defining a texture map associated with the image;

determining a lighting characteristic associated with a texel of the texture map by sampling a center point of the texel, wherein the texel is capable of having one of a one to many correspondence to respective pixels or a many to one correspondence to a single pixel; and

associating the texel with the lighting characteristic.

9. (previously presented) The method of claim 8, wherein the method operation of determining a lighting characteristic associated with a texel of the texture map includes,

identifying a point on the object associated with the image; and

calculating a coefficient representing the lighting characteristic through the application of a basis function with the center point.

10. (original) The method of claim 8, further comprising:

rendering the image on a display screen, wherein the lighting characteristic defines shadows associated with the image being displayed.

11. (previously presented) The method of claim 10, wherein the image on the display screen is associated with a first resolution of a model of the object and the image is associated with a second resolution of the model of the object, wherein the first resolution is less than the second resolution.

12. (original) The method of claim 8, wherein the lighting characteristic includes both self shadowing and self interreflection components.

13. (previously presented) The method of claim 8, wherein the method operation of determining a lighting characteristic associated with a texel of the texture map includes,

calculating the lighting characteristic in a manner such that an intensity of the lighting characteristic does not fluctuate when a light source is moved.

14. (original) The method of claim 8, wherein the lighting characteristic is derived from a transfer function.

15. (previously presented) The method of claim 14, wherein the transfer function calculates a value representing reflected light from a surface of an object associated with the image.

16. (currently amended) A method for rendering an object associated with an image, comprising:

defining a texture map associated with the image, wherein each of the texels are capable of having one of a one to many correspondence with respective pixels or a many to one correspondence with a single pixel;

associating a value corresponding to a multi-directional signal with a texel of the texture map by sampling a center point of the texel;

determining an intensity of a pixel associated with the texel, the determining including,

accessing the value associated with the texel; and

applying the value to a quantity representing a light source component.

17. (previously presented) The method of claim 16, wherein the method operation of associating a value corresponding to a multi-directional signal with a texel of the texture map includes,

computing a function representing reflected light over a sphere of incoming light relative to the center point of the texel.

18. (original) The method of claim 16, wherein the method operation of associating a value corresponding to a multi-directional signal with a texel of the texture map includes,

inserting the value with data corresponding to the texel.

19. (original) The method of claim 16, further comprising:

displaying the pixel having the intensity.

20. (original) The method of claim 17, wherein the method operation of applying the value to a quantity representing a light source component includes,

projecting both the function representing reflected light and a function deriving the light source component into spherical harmonic coefficients; and

defining an integral of a product of the function representing reflected light and the function deriving the light source component.

21. (original) The method of claim 20 wherein the integral is equal to a dot product of respective coefficients of each of the functions.

22. (currently amended) A computer readable medium having program instructions for rendering an image with high resolution lighting characteristics, comprising:

program instructions for calculating a value representing a lighting characteristic for each of the texels without calculating a lighting function at triangle corners;

program instructions for accessing a lighting characteristic value associated with a texel of a texture map associated with the image;

program instructions for associating a coordinate space of the texture map with a display screen coordinate space; and

program instructions for applying the lighting characteristic value to a corresponding pixel for presentation on the display screen, wherein each of the texels are capable of having one of a one to many correspondence with respective pixels or a many to one correspondence with a single pixel.

23. (original) The computer readable medium of claim 22, wherein the program instructions for associating a coordinate space of the texture map with a display screen coordinate space includes,

program instructions for mapping the coordinate space of the texture map with the display screen coordinate space.

24. (original) The computer readable medium of claim 22, wherein the program instructions for applying the lighting characteristic value to a corresponding pixel for presentation on the display screen includes,

program instructions for multiplying coefficients of the lighting characteristic with coefficients representing incoming light.

25. (original) The computer readable medium of claim 22, wherein the lighting characteristic is derived from a spherical harmonics based function.

26. (currently amended) A computer readable medium having program instructions for incorporating lighting characteristics of an image associated with an object into a texture map, comprising:

program instructions for defining a texture map associated with the image;

program instructions for determining a lighting characteristic associated with a texel of the texture map by sampling a center point of the texel, wherein each of the texels are capable of having one of a one to many correspondence with respective pixels or a many to one correspondence with a single pixel; and

program instructions for associating the texel with the lighting characteristic.

27. (previously presented) The computer readable medium of claim 26, wherein the program instructions for determining a lighting characteristic associated with a texel of the texture map includes,

program instructions for identifying a point on the object associated with the image; and

program instructions for calculating a coefficient representing the lighting characteristic through the application of a spherical basis function with the center point.

28. (original) The computer readable medium of claim 26, wherein the lighting characteristic includes both self shadowing and self interreflection components.

29. (original) The computer readable medium of claim 26, wherein the program instructions for determining a lighting characteristic associated with a texel of the texture map includes,

program instructions for calculating the lighting characteristic in a manner such that an intensity of the lighting characteristic does not fluctuate when a light source is moved.

30. (original) The computer readable medium of claim 26, wherein the lighting characteristic is derived from a transfer function.

31. (previously presented) The computer readable medium of claim 30, wherein the transfer function is configured to determine a value representing reflected light from a surface of the object associated with the image.

32. (currently amended) A computing device, comprising:

a memory capable of storing data representing a texture map associated with an object of image, the texture map containing a texel, the texel associated with data describing a light field for a point within the texel according to a basis function;

logic for mapping the texel to a pixel associated with a display screen in communication with the computing device;

logic for accessing the data describing the light field;

logic for determining an intensity associated with the pixel based upon the data describing the light field; and

logic for enabling presentation of the intensity of the pixel on the display screen.

33. (original) The computing device of claim 32, wherein the computing device is one of a video game console and a server.

34. (original) The computing device of claim 32, further comprising:

a display screen in communication with the computing device.

35. (previously presented) The computing device of claim 32, wherein the logic for determining an intensity associated with the pixel based upon the data describing the light field includes,

logic for determining an incoming illumination value without calculating a lighting function at triangle corners; and

logic for combining the incoming illumination value with the data describing the light field.

36. (currently amended) An integrated circuit, comprising:

a memory capable of storing data corresponding to a self shadow and self interreflection lighting characteristics associated with an image;

circuitry for accessing the data;

circuitry for determining an intensity associated with a pixel based upon a product of the data and an illumination value, the illumination value derived without calculating the lighting function at triangle corners wherein the pixel is capable of having one of a one to many correspondence with respective texels associated with the pixel or a many to one correspondence with a single texel associated with the pixel; and

circuitry for enabling presentation of the intensity of the pixel on the display screen.

37. (previously presented) The integrated circuit of claim 36, wherein the image is associated with an object of a video game and the illumination value is derived by a transfer function that samples a center point of a texel of the object.

38. (original) The integrated circuit of claim 36, wherein the integrated circuit is incorporated into a video game console.

39. (original) The integrated circuit of claim 36, wherein the data is associated with a texel of a texture map stored in memory.

40. (original) The integrated circuit of claim 39, wherein a lookup table maps the texel to the pixel.